2

MATHEMATICS TEST

40 Minutes—40 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer folder.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

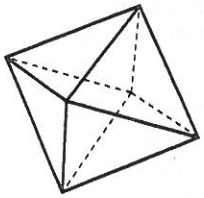
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. An elevator in a high-rise office building let off passengers on the 20th floor and then went up 12 floors to pick up Abe, who rode down 7 floors and got off the elevator. As Abe got off, Betty got on and rode up 15 floors, where she got off and Carlos got on. Carlos rode down 4 floors and got off. At what floor did Carlos get off the elevator?

   A. 4th
   B. 14th
   C. 20th
   D. 26th
   E. 36th

2. The point at the intersection of 4 faces of an octahedron (shown below) is called a *vertex point*. How many vertex points does an octahedron have?



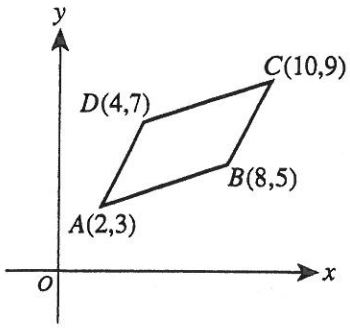
   F. 6
   G. 8
   H. 12
   J. 16
   K. 24

3. A formula commonly used to calculate distance traveled is $d = rt$, in which d is distance, r is rate, and t is time traveled. How many hours will it take you to travel 360 miles at an average rate of 45 miles per hour?

   A. 0.125
   B. 1.25
   C. 8
   D. 315
   E. 16,200

DO YOUR FIGURING HERE.

4. As shown in the standard (x,y) coordinate plane below, parallelogram $ABCD$ has vertices $A(2,3)$, $B(8,5)$, $C(10,9)$, and $D(4,7)$. The midpoint of $\overline{AC}$ is the same as the midpoint of what other segment?



F. $\overline{AB}$
G. $\overline{AD}$
H. $\overline{BC}$
J. $\overline{BD}$
K. $\overline{CD}$

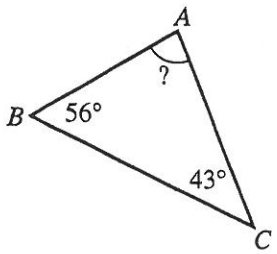
5. Which of the following is equivalent to $2x^4$?

A. $2 \cdot x \cdot 4$
B. $2 \cdot 4 \cdot x \cdot 4$
C. $2 \cdot x \cdot x \cdot x \cdot x$
D. $2 \cdot 4 \cdot x \cdot x \cdot x \cdot x$
E. $2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x$

6. The area of a rectangle is 28 square millimeters. The length of the rectangle is 7 millimeters. What is the width of the rectangle, in millimeters?

F. 4
G. 7
H. 8
J. 21
K. 35

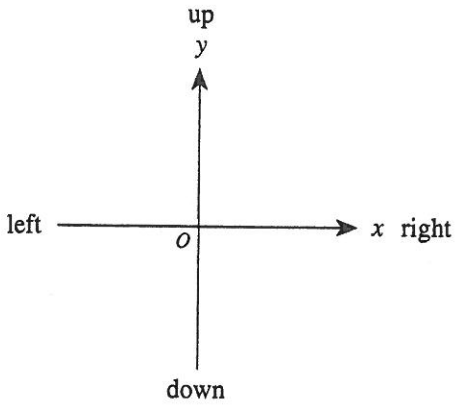
7. In $\triangle ABC$ below, what is the measure of $\angle A$?



A. 77°
B. 81°
C. 90°
D. 99°
E. 103°

DO YOUR FIGURING HERE.

8. Which of the following phrases describes the location of the point (4,–7) relative to the origin in the standard (x,y) coordinate plane below?



F. Left 7 units, up 4 units
G. Left 4 units, up 7 units
H. Right 7 units, down 4 units
J. Right 4 units, up 7 units
K. Right 4 units, down 7 units

9. The city block that Addie lives on is rectangular, having a length of 420 feet and a width of 350 feet. When Addie walks along the entire perimeter of the city block once, how many feet does she walk?

A. 770
B. 1,400
C. 1,470
D. 1,540
E. 1,680

10. Tama, a member of the school basketball team, has made 18 free throws of the 25 free throws she has attempted. What percent of her free throws has she made?

F. 7%
G. 13%
H. 18%
J. 25%
K. 72%

11. The sum of 6 numbers is 108, and the sum of 9 other numbers is 162. What is the average of these 15 numbers?

A. 7.5
B. 18
C. 20
D. 36
E. 135

DO YOUR FIGURING HERE.

12. The operation B @ C is defined as $B + 2C$. What is the value of 8 @ 3 ?

F. 14
G. 19
H. 22
J. 24
K. 48

13. Which of the following lists the fractions $\frac{11}{21}$, $\frac{13}{25}$, and $\frac{2}{3}$ in order from least to greatest?

A. $\frac{2}{3} < \frac{11}{21} < \frac{13}{25}$
B. $\frac{11}{21} < \frac{13}{25} < \frac{2}{3}$
C. $\frac{11}{21} < \frac{2}{3} < \frac{13}{25}$
D. $\frac{13}{25} < \frac{2}{3} < \frac{11}{21}$
E. $\frac{13}{25} < \frac{11}{21} < \frac{2}{3}$

14. Which of the following inequalities is equivalent to $2x - 9 \geq 11$?

F. $x \leq 10$
G. $x \geq -\frac{7}{2}$
H. $x \geq 1$
J. $x \geq 10$
K. $x \geq \frac{29}{2}$

15. For every integer n, the sum of n and $(n + 1)$ is:

A. odd.
B. even.
C. divisible by 3.
D. divisible by 5.
E. divisible by 7.

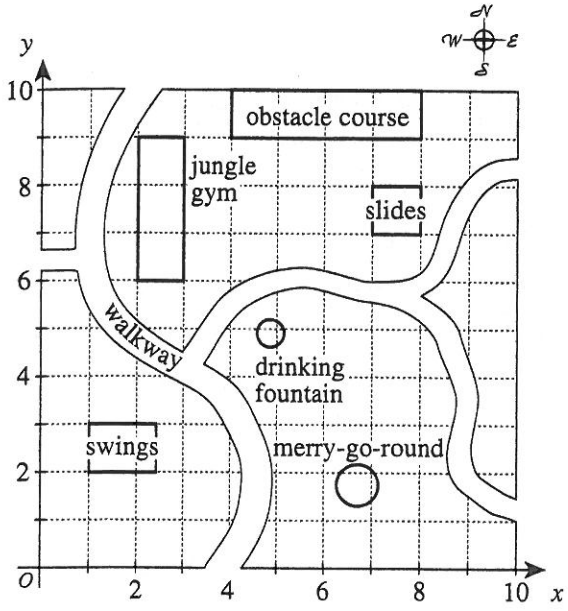
16. What is the value of the expression $200 - 3(\sqrt{9-4})^2$?

F. 125
G. 169
H. 185
J. 191
K. 197

DO YOUR FIGURING HERE.

Use the following information to answer questions 17 and 18.

A diagram of a playground is shown in Quadrant I in the standard (x,y) coordinate plane below. Each unit on each axis represents 10 yards. The playground has a walkway, sections for 5 activities (swings, merry-go-round, slides, jungle gym, and obstacle course), and a drinking fountain near the center.



17. Freddie always enters the playground from the south and plays on the swings first. He proceeds to the other 4 activities at random. In how many different orders can he visit each of the other 4 activities exactly once?

A. 4
B. 10
C. 24
D. 120
E. 720

18. Which of the following is closest to the distance, in yards, from the northwest corner of the swings to the northwest corner of the slides?

F. 80
G. 90
H. 110
J. 120
K. 140

DO YOUR FIGURING HERE.

19. What is the positive difference between the mean and the median of the 6 numbers given below?

13 23 12 20 13 15

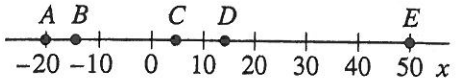
A. 0
B. 1
C. 2
D. 3
E. 4

20. The monthly expenses and income from March through May for the Footloose Shoe Store are shown in the chart below. What was the total profit or loss from March through May?

	Income	Expense
March	$172,000	$156,000
April	$158,000	$146,000
May	$192,000	$186,000

F. Loss of $14,000
G. Loss of $30,000
H. Profit of $ 6,000
J. Profit of $20,000
K. Profit of $34,000

21. One of the points on the real number line shown below represents the sum of $3\sqrt{36}$ and $-8\sqrt{16}$. Which one?



A. *A*
B. *B*
C. *C*
D. *D*
E. *E*

22. When the sum of the digits in a number is divisible by 3, then so is the number. The 5-digit number below will be divisible by 3 if which of the following digits is in the tens place?

27,8□5

F. 9
G. 6
H. 3
J. 2
K. 1

23. $|2(1-5)+3| = ?$

A. −5
B. 5
C. −11
D. 11
E. 15

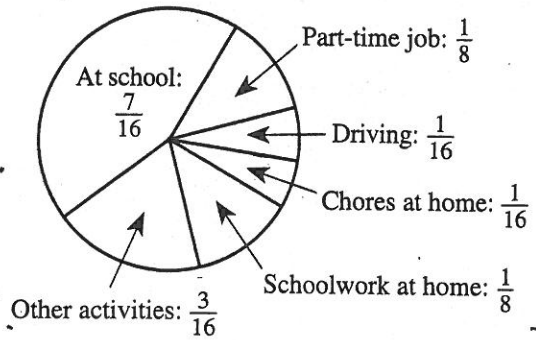
DO YOUR FIGURING HERE.

30. The Dawn Theater charges \$6.00 for each adult ticket and \$2.50 for each child's ticket for an early movie. For last Saturday's early movie, 240 tickets were sold for a total of \$1,265.00. How many adult tickets were sold?

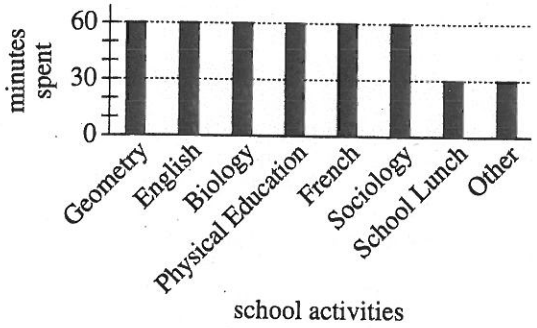
F. 28
G. 50
H. 120
J. 125
K. 190

31. According to the graphs below, what fraction of Girard's 16 waking hours on each weekday is spent at School Lunch?

Fraction of Girard's 16 waking hours spent on activities each weekday



Distribution of Girard's time "At school"



A. $\frac{1}{16}$

B. $\frac{1}{24}$

C. $\frac{1}{32}$

D. $\frac{1}{48}$

E. $\frac{7}{128}$

DO YOUR FIGURING HERE.

32. What is the ratio of the number of positive common multiples less than 100 of the numbers 3 and 5 to the number of positive common multiples less than 100 of the numbers 2 and 7 ?

(Note: For example, the positive common multiples less than 100 of 2 and 3 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, and 96.)

F. $\frac{6}{7}$

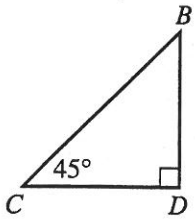
G. $\frac{6}{13}$

H. $\frac{7}{6}$

J. $\frac{7}{13}$

K. $\frac{13}{6}$

33. In $\triangle BCD$ below, altitude $\overline{BD}$ is 4 inches long. What is the perimeter, in inches, of $\triangle BCD$?



A. 8

B. $8 + 4\sqrt{2}$

C. $12\sqrt{2}$

D. $12 + \sqrt{3}$

E. 16

34. A circular play area has a diameter of 12 yards. A fence is put around the play area, with a 2-yard section of the circle left open as the entrance. Which of the following is closest to the minimum number of yards of fencing needed?

F. 32
G. 36
H. 38
J. 69
K. 73

DO YOUR FIGURING HERE.

35. At Toys-for-Less, Zorts sell for a particular unit price, regardless of how many you purchase. For x dollars, you can purchase 200 Zorts. How many Zorts can you purchase for n dollars, if n is a multiple of the unit price of the Zorts?

A. $\frac{xn}{200}$

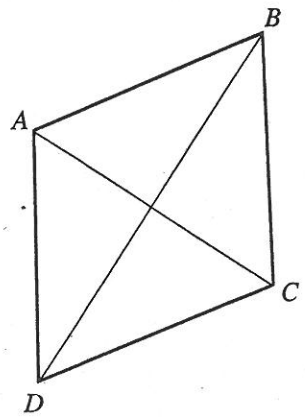
B. $\frac{200}{xn}$

C. $\frac{x}{200n}$

D. $\frac{200n}{x}$

E. $\frac{200x}{n}$

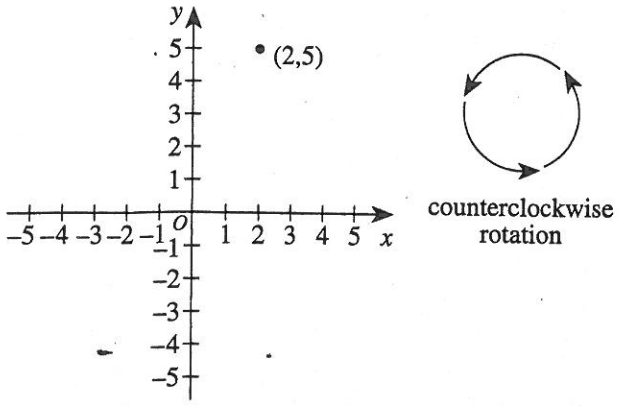
36. In the figure below, $ABCD$ is a quadrilateral with all 4 sides congruent. The diagonals, $\overline{AC}$ and $\overline{BD}$, bisect each other and have lengths of 30 centimeters and 40 centimeters, respectively. What is the area of $ABCD$, in square centimeters?



F. 150
G. 300
H. 600
J. 625
K. 1,200

DO YOUR FIGURING HERE.

37. The point (2,5) is shown in the standard (x,y) coordinate plane below. What are the coordinates of the image of (2,5) under a counterclockwise rotation of 90° about the origin?



A. (–5, 2)
B. (–2,–5)
C. (–2, 5)
D. (5,–2)
E. (5, 2)

38. In the standard (x,y) coordinate plane, the slope of the line $\overleftrightarrow{AB}$ is 3 times the y-intercept of the line $\overleftrightarrow{BC}$. The equation for $\overleftrightarrow{BC}$ is $8x + 4y = 10$. What is the slope of $\overleftrightarrow{AB}$?

F. –6

G. –2

H. $\frac{5}{2}$

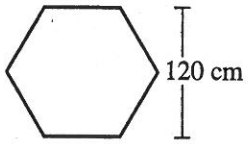
J. $\frac{5}{6}$

K. $\frac{15}{2}$

39. A line drawn in the standard (x,y) coordinate plane passes through the points (p,q) and $(m,-q)$. The slope of the line is 2. What is $p - m$, in terms of q ?

A. $-4q$
B. $-q$
C. 0
D. q
E. $4q$

40. What is the length, in centimeters, of 1 side of the regular hexagon shown below?



F. $20\sqrt{3}$
G. $40\sqrt{3}$
H. $80\sqrt{3}$
J. $120\sqrt{2}$
K. 120

DO YOUR FIGURING HERE.

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.